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PETER J. OSTROSKEY
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MEMORANDUM

To: Heads of Fire Departments
From: Peter J. Ostroskey
Date: February 06, 2023
Re: **Dangers of Lithium Batteries**

As with many new technologies, the rapid expansion of lithium-type battery use has come with new dangers. And as it always has, the fire service has adapted to confront these dangers in a way that protects our personnel and the communities we serve.

As firefighters in Massachusetts, across the country, and around the world respond to more and more fires and explosions involving rechargeable lithium-ion batteries and disposable lithium metal batteries, our knowledge base has grown. The most frequent lithium-type battery fires can be fully and safely extinguished by local fire departments and, if necessary, mutual aid partners. Once the batteries, battery packs, and associated debris have been rendered safe, the owner of the device should hire a hazardous waste contractor to transport it from the scene and dispose of it properly. If the owner does not have the means to hire a hazardous waste contractor, the Massachusetts Department of Environmental Protection (DEP) can hire one. Contact DEP Emergency Response at 1-888-304-1133.

If the circumstances of a fire, explosion, or other hazard related to lithium-type batteries go beyond extinguishment and transport/disposal, or if you encounter or anticipate an unusual or abnormal condition at the scene, do not hesitate to activate or consult with your local Hazardous Materials Response Team. Call 877-385-0822 and follow the appropriate prompts.

For questions during normal business hours, please contact the DFS Hazardous Materials Emergency Response Division at 978-567-3150 or email Division Director David DiGregorio at david.digregorio@mass.gov.

Administrative Services • Division of Fire Safety
Hazardous Materials Response • Massachusetts Firefighting Academy

Most of these incidents are now readily understood and no longer present the unknown, hidden, or highly specialized dangers that call for a Hazmat team. But while they are becoming relatively common, they do remain hazardous. The following guidance is presented for consideration by fire officers as they plan out the response to a lithium-type battery fire:

(Rechargeable) Lithium-Ion Batteries

1. Vape Devices, Cell Phones, Tablets, Computers

WARNING: Lithium-ion batteries can vent large amounts of flammable and toxic gases to create flammable and explosive atmospheres. Pressurized white “smoke” may vent moments prior to ignition of flammable/toxic gases.

- These types of devices vary in the number of lithium batteries they contain
- Use of improper charger can cause battery abuse
- Although battery packs are smaller in nature and contain fewer individual batteries than larger devices, the following precautions still apply:
- **Response Considerations**
 - Batteries on these devices can vent and/or catch fire from thermal, electrical, or physical abuse
 - Abuse of lithium-ion battery cell can cause thermal runaway and propagate to other cells causing a slow “domino” effect
 - Gases and vapors venting from the battery cells may be toxic and/or flammable
 - Use CGL/LEL to check for flammable environments
 - Avoid entering confined areas; do not take units on elevators
 - Use appropriate PPE such as structural turnout gear and SCBA
 - If charging, consider unplugging or shutting off power if no flammable environment exists
 - Consider moving device from structure or away from exposures
- **Fire Considerations**
 - Control fire with water, protect exposures, and cool battery cells
 - Foam, CO₂, Dry Chemical, and Class D extinguishers are ineffective
 - Observe battery cells with Thermal Imaging Camera (TIC)
 - Battery cells can ignite days after original incident
 - Li-Ion batteries or mobility devices that are involved in fire, found within a fire area, or subject to elevated temperatures should be moved from the fire area as soon as possible. This should be done prior to overhaul when possible.
 - A diligent search should be made for stray battery cells, which may have become dislodged during fire conditions and or extinguishment. These stray cells may become a source of ignition for a rekindle fire.
 - Battery cells should be stored a safe distance from other combustibles.
 - Owner of Lithium-ion battery device should hire a Hazardous Waste (HW) Contractor for transport/disposal of lithium-ion battery container under hazardous waste manifest. If owner does not have the means to hire HW Contractor, DEP may hire a HW Contractor for transport/disposal of lithium-ion battery container under hazardous waste manifest. DEP Emergency Response-1-888-304-1133.

2. Personal Mobility Devices/ E-Bikes

WARNING: Lithium-ion batteries can vent large amounts of flammable and toxic gases to create flammable and explosive atmospheres. Pressurized white “smoke” may vent moments prior to ignition of flammable/toxic gases.

- Scooters, hover boards, bikes (may fold for storage/transport)
- Use of improper charger can cause battery abuse
- Battery Pack
 - Composed of multiple cells and a battery management system
 - May be located on floor board, frame rail, or rear rack of bike
 - Pack may be removable or installed
- **Response Considerations**
 - Batteries on mobility devices can vent and/or catch fire from thermal, electrical, or physical abuse
 - Abuse of lithium-ion battery cell can cause thermal runaway and propagate to other cells causing a slow “domino” effect
 - Gases and vapors venting from the battery cells may be toxic and/or flammable
 - Use CGL/LEL to check for flammable environments
 - Avoid entering confined areas; do not take units on elevators
 - Use appropriate PPE such as structural turnout gear and SCBA
 - If charging, consider unplugging or shutting off power if no flammable environment exists
 - Consider moving device from structure or away from exposures
- **Fire Considerations**
 - Control fire with water, protect exposures, and cool battery cells
 - Foam, CO₂, Dry Chemical, and Class D extinguishers are ineffective
 - Observe battery cells with Thermal Imaging Camera (TIC)
 - Battery cells can ignite days after original incident
 - Li-Ion batteries or mobility devices that are involved in fire, found within a fire area, or subject to elevated temperatures should be moved from the fire area as soon as possible. This should be done prior to overhaul when possible.
 - A diligent search should be made for stray battery cells, which may have become dislodged during fire conditions and or extinguishment. These stray cells may become a source of ignition for a rekindle fire.
 - Battery cells should be stored a safe distance from other combustibles.
 - Owner of Lithium-ion battery device should hire a Hazardous Waste (HW) Contractor for transport/disposal of lithium-ion battery container under hazardous waste manifest. If owner does not have the means to hire HW Contractor, DEP may hire a HW Contractor for transport/disposal of lithium-ion battery container under hazardous waste manifest. DEP Emergency Response-1-888-304-1133.

3. Electric Vehicles (EVs)

WARNING: Lithium-ion batteries can vent large amounts of flammable and toxic gases to create flammable and explosive atmospheres. Pressurized white “smoke” may vent moments prior to ignition of flammable/toxic gases.

- **Design/Construction**

- 1500+ small lithium-ion battery cells or pouches are grouped together into battery modules
- Multiple battery modules are installed in the vehicle to make up the battery pack
- High-voltage cables are often colored-coded orange
- ***Response Considerations***
 - Use appropriate PPE such as structural turnout gear and SCBA
 - Follow manufacturer (OEM) specific guidance
 - Silent engine noise does not mean that the vehicle is off
 - Stabilize the vehicle
 - Shift into park
 - Turn off vehicle
 - Chock all four tires
 - Remove key (fob, card, or owner's phone)
 - Batteries in EVs can vent or catch fire from thermal, electrical, or physical abuse
 - Abuse of lithium-ion battery cells can cause thermal runaway and propagate to other cells
 - Gases and vapors venting from battery cells may be toxic and/or flammable
 - Use caution in confined areas including garages or shipping containers
 - Use CGI/LEL to check flammable environments
 - If charging, consider unplugging or shutting off power if no flammable environment exists
 - Check the area for battery cells that may have been ejected from the battery pack
 - Ensure towing/recovery personnel are briefed on hazards including re-ignition or delayed ignition for both transport and storage
 - Consider following the vehicle to the tow yard for vehicles involved in fire and or accidents with significant vehicle damage
 - Vehicles should be visibly identified as a hybrid or electric vehicle (EV)
 - Vehicles should be stored away from other vehicles, ideally 50 feet away from any combustibles. Larger EV's may require further distance
 - If an EV is towed and tarped outside to preserve evidence, be aware that gasses released from the battery may accumulate under the tarp
- ***Fire Considerations***
 - Select appropriate strategy (non-intervention, defensive, offensive)
 - Consider controlling the fire with water, protecting exposures, and cooling battery cells versus controlled burn
 - Observe battery cells with Thermal Imaging Camera (TIC)
 - Consider waiting until no fire, smoke, audible hissing or heating present for at least **45** minutes before the vehicle is released
 - Battery cells can vent/re-ignite days after original incident
 - Foam, CO₂, Dry Chemical, and Class D extinguishers are ineffective
 - Owner of Lithium-ion battery device should hire a Hazardous Waste (HW) Contractor for transport/disposal of lithium-ion battery container under hazardous waste manifest. If owner does not have the means to hire HW Contractor, DEP may hire a HW Contractor for transport/disposal of lithium-ion battery container under hazardous waste manifest. DEP Emergency Response-1-888-304-1133.

Hazmat Response – If a large scale or an unusual situation involving Lithium-ion Batteries is encountered, a Tier 1+ response may be requested.